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| EXAMINER | |
|---|---|
| AKHAVANNIK, HUSSEIN | |

| ART UNIT | PAPER NUMBER |
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DATE MAILED: 09/09/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 09/895,063 | REED ET AL. | |
| | Examiner | Art Unit | |
| | Hussein Akhavannik | 2621 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1-20* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-20* is/are rejected.

7)☒ Claim(s) *1,6-8,11-13,16,17 and 19* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *29 June 2001* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

## DETAILED ACTION

### *Specification*

1. The abstract of the disclosure is objected to because "Fore example," should be changed to "For example," in line 5. Correction is required. See MPEP § 608.01(b).

2. The disclosure is objected to because of the following informalities:

- On page 1, paragraph 3, "images is then synthesizes" should be changed to "image is then synthesized".
- On page 5, paragraph 2, "in image 30" should be changed to "in image 303" to correspond to figure 3.

Appropriate correction is required.

### *Claim Objections*

3. Claims 1, 6-8, 11-13, and 17 are objected to because of the following informalities:

- In claim 1, line 6, the comma should be followed by "and".
- In claim 6, line 4, the comma should be followed by "and".
- In claim 7, line 2, "images a combined" should be changed to "images are combined".
- In claim 8, line 1, "A method combining a generating" should be changed to "A method of combining and generating".
- In claim 8, line 5, the comma should be followed by "and".
- In claim 11, line 7, the comma should be followed by "and".
- In claim 12, line 4, the comma should be followed by "and".

- In claim 13, line 1, "A method combining a generating" should be changed to "A method of combining and generating".
- In claim 13, line 5, the comma should be followed by "and".
- In claim 17, line 7, the comma should be followed by "and".

Appropriate correction is required.

***Claim Rejections - 35 USC § 112***

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claims 1-7, 11-12, and 20 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Referring to claims 1, 6, 11-12, and 20, these claims are indefinite for failing to identify the environment of the method (the preamble of the claim) versus the steps of the method. This claim does not recite a transition such as "comprising" or "consisting of" in order to identify the end of the preamble and the start of the steps. In claim 1, the Examiner assumes that "by" recited at the end of line 2 is the transition. In claim 6, the Examiner assumes that "Bayer square," recited at the end of line 2 is the transition. In claim 11, the Examiner assumes that "including" recited at the end of line 2 is the transition. In claim 6, the Examiner assumes that "Bayer square," recited at the end of line 2 is the transition. In claim 12, the Examiner assumes that "Bayer square configuration," recited at the end of line 2 is the transition. In claim 20, the Examiner assumes that "wherein" recited in line 2 is the transition.

Referring to claims 2-5, 7, these claims are indefinite for depending from an indefinite antecedent base claim.

***Double Patenting***

6. A rejection based on double patenting of the "same invention" type finds its support in the language of 35 U.S.C. 101 which states that "whoever invents or discovers any new and useful process ... may obtain a patent therefor ..." (Emphasis added). Thus, the term "same invention," in this context, means an invention drawn to identical subject matter. See *Miller v. Eagle Mfg. Co.*, 151 U.S. 186 (1894); *In re Ockert*, 245 F.2d 467, 114 USPQ 330 (CCPA 1957); and *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970).

A statutory type (35 U.S.C. 101) double patenting rejection can be overcome by canceling or amending the conflicting claims so they are no longer coextensive in scope. The filing of a terminal disclaimer cannot overcome a double patenting rejection based upon 35 U.S.C. 101.

7. Claim 13 is objected to under 37 CFR 1.75 as being a substantial duplicate of claim 8. The only differences between claims 8 and 13 are that claim 8 recites "said low resolution images" in line 5 and "said aligned low resolution images" in line 6, whereas claim 13 recites "said images" in line 5 and "said aligned images" in line 6. However, "said images" in claim 13 points to "a plurality of low resolution electronic images" in line 4 and therefore, claims 8 and 13 claim the same subject matter. When two claims in an application are duplicates or else are so close in content that they both cover the same thing, despite a slight difference in wording, it is proper after allowing one claim to object to the other as being a substantial duplicate of the allowed claim. See MPEP § 706.03(k).

***Allowable Subject Matter***

8. Claims 16 and 19 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

9. Claim 11 would be allowable if rewritten or amended to overcome the rejection(s) under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action.

10. Claim 5 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

***Claim Rejections - 35 USC § 102***

11. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

12. Claims 1, 8, 13, 15, and 17 are rejected under 35 U.S.C. 102(e) as being anticipated by Honjoh (U.S. Patent No. 6,466,253).

Referring to claim 1,

i. Reading a reference signal from each of the low resolution images to determine the alignment of the pixels in the image is explained by Honjoh in column 7, lines 12-23 wherein the extracted contours are used to create a characteristic pattern (corresponding to the reference signal) in order to determine the relative displacement amounts for each frame (corresponding to the alignment of the pixels in the image). Honjoh illustrates in figure 3 that the characteristic pattern is determined from each of the sequential still images, corresponding to the low resolution images as explained by Honjoh in column 1, line 62 to column 2, line 12.

ii. Selecting the images whose pixels are within a specified tolerance from specified positions is explained by Honjoh in column 8, lines 4-14 wherein the images that are substantially overlapping (within $\Delta(n_t)$) are used to create a high resolution image. Honjoh illustrates that the corresponding pixels of 4 still images are not more than one pixel distance apart in figure 5A.

iii. Combining the selected images to generate a high resolution image is illustrated by Honjoh in figure 3 by "combine frames".

Referring to claims 8 and 13,

i. Producing a physical image which includes a hidden reference signal is illustrated by Honjoh in figure 3 and explained in column 7, lines 12-23 wherein the extracted contours are used to create a characteristic pattern (corresponding to the reference signal). The contours are hidden within the image before they are extracted to produce the reference signal.

ii. Capturing a plurality of low resolution electronic images of said physical image is illustrated by Honjoh in figure 3 by the sequential still images.

iii. Using the reference signal to align a plurality of the low resolution images is explained by Honjoh in column 8, lines 4-14 wherein the images that are substantially overlapping (within $\Delta(n_t)$) are aligned and used to create a high resolution image.

iv. Combining the aligned low resolution images into a high resolution image is illustrated by Honjoh in figure 3 by "combine frames".

Referring to claim 15, a plurality of low resolution images being captured and only a selected number of said low resolution images being used to form the high resolution image is

illustrated by Honjoh in figure 3, wherein a plurality of sequential still images are captured and combined to form a high resolution image. Honjoh explains that a selected number of frames are required to produce a high resolution image in column 9, lines 1-6.

Referring to claim 17,

i. Capturing a series of low resolution images, each of which contain a reference signal is illustrated by Honjoh in figure 3 by the sequential still images.

ii. Reading the reference signal from each of the low resolution images is explained by Honjoh in column 7, lines 12-23 wherein the extracted contours are used to create a characteristic pattern (corresponding to the reference signal) in order to determine the relative displacement amounts for each frame (corresponding to the alignment of the pixels in the image). Honjoh illustrates in figure 3 that the characteristic pattern is determined from each of the sequential still images, corresponding to the low resolution images as explained by Honjoh in column 1, line 62 to column 2, line 12.

iii. Aligning the low resolution images in accordance the location of the reference signal is explained by Honjoh in column 8, lines 4-14 wherein the images that are substantially overlapping (within $\Delta(n_t)$) are used to create a high resolution image.

iv. Combining the aligned low resolution images into a high resolution image is illustrated by Honjoh in figure 3 by "combine frames".

***Claim Rejections - 35 USC § 103***

13. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person

having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

14. Claims 2-3, 6-7, 9-10, 12, and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Honjoh in view of Glotzbach et al (U.S. Patent Pub. No. 2002/0041761 A1).

Referring to claim 2, the alignment being determined relative to the positions in a Bayer square is not explicitly explained by Honjoh. Honjoh does explain that the CCD of the digital camera used is a two-dimensional matrix and that the resolution of the CCD is about 500x800 pixels in column 1, lines 43-46 and column 1, line 62 to column 2, line 3. Honjoh further illustrates that the pixels from four still images are arranged in a 2x2 matrix in figure 5A. However, Glotzbach et al explain that a common Color-Filtered Array is the Bayer pattern, which consists of 2x2 cell elements in paragraph 35. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to align low resolution images relative to a Bayer square in the system of Honjoh because Glotzbach et al explain that the Bayer square is a common structure for CCDs and Honjoh illustrate aligning the images according to a 2x2 matrix.

Referring to claim 3, the pixels in said low resolution images having colors in accordance with a Bayer square is not explicitly explained by Honjoh. Honjoh does explain that the CCD of the digital camera used is a two-dimensional matrix and that the resolution of the CCD is about 500x800 pixels in column 1, lines 43-46 and column 1, line 62 to column 2, line 3. However, Glotzbach et al explain that a common Color-Filtered Array is the Bayer pattern, which consists of 2x2 cell elements in paragraph 35 and illustrate the Bayer color pattern in figure 7a. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made for the CCD of Honjoh to use the Bayer pattern suggested by Glotzbach et al because

the Bayer pattern was common and well known in the art and widely used for inexpensive digital cameras, such as the camera of Honjoh.

Referring to claims 6 and 12, determining which of the low resolution images align with each pixel hole position of a Bayer square and combining the multiple low resolution images to fill in the holes in a Bayer square is not explicitly explained by Honjoh. Honjoh does illustrate calculating the displacement amounts between multiple still images and then combining the still images to produce a high resolution image in figure 3. The combination is illustrated in figure 5A, wherein the corresponding pixels of four still images are arranged in a 2x2 matrix for every pixel location. Honjoh does not explicitly explain that alignment is performed according to the pixel hole positions of a Bayer square. However, Glotzbach et al explain that a common Color-Filtered Array is the Bayer pattern, which consists of 2x2 cell elements in paragraph 35. Thus, by arranging the pixels of the four still images in a 2x2 matrix when the CCD used is arranged according to the Bayer square, the images will be aligned according to the pixel hole position of a Bayer square. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to determine which of the low resolution images align with each pixel hole position of a Bayer square and combining the multiple low resolution images to fill in the holes in a Bayer square in the system of Honjoh, as suggested by Glotzbach et al because the Bayer pattern was common and well known in the art and widely used for inexpensive digital cameras, such as the camera of Honjoh.

Referring to claim 7, the pixels values in multiple images which are aligned with each pixel position being averaged and the averaged images being combined to fill the holes in a Bayer square is explained by Honjoh in column 9, line 52 to column 10, line 17 and illustrated in

figure 5C. Honjoh explains that the four pixels corresponding to each pixel position are interpolated (corresponding to averaged) to create high resolution pixels, from a series of Bayer patterns, corresponding to claim 6.

Referring to claim 9, the low resolution images being aligned in accordance with the holes in a Bayer square is not explicitly explained by Honjoh. Honjoh does explain that the CCD of the digital camera used is a two-dimensional matrix and that the resolution of the CCD is about 500x800 pixels in column 1, lines 43-46 and column 1, line 62 to column 2, line 3. Honjoh further illustrates that the pixels from four still images are arranged in a 2x2 matrix in figure 5A. However, Glotzbach et al explain that a common Color-Filtered Array is the Bayer pattern, which consists of 2x2 cell elements in paragraph 35. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to align low resolution images in accordance with the holes in a Bayer square in the system of Honjoh because Glotzbach et al explain that the Bayer square is a common structure for CCDs and Honjoh illustrate aligning the images according to a 2x2 matrix.

Referring to claim 10, a plurality of low resolution images being captured and only those low resolution images which align to within a specified tolerance with the holes in a Bayer square being used to form said composite image is not explicitly explained by Honjoh. Honjoh does illustrate capturing a plurality of low resolution image in figure 3 by obtaining sequential still images. Honjoh further illustrates that the pixels from four still images are arranged in a 2x2 matrix and the corresponding pixels of 4 still images are not more than one pixel distance apart in figure 5A. However, Glotzbach et al explain that a common Color-Filtered Array is the Bayer pattern, which consists of 2x2 cell elements in paragraph 35. Therefore, it would have been

obvious to one of ordinary skill in the art at the time the invention was made to capture a plurality of low resolution images and combine only the images that align within a specified tolerance with the holes in a Bayer square to create a high resolution image in the system of Honjoh, as suggested by Glotzbach et al, because Glotzbach et al explain that the Bayer square is a common structure for CCDs and Honjoh illustrate aligning the images according to a 2x2 matrix.

Referring to claim 14, the low resolution images being combined to fill holes in a Bayer square is square is not explicitly explained by Honjoh. Honjoh does illustrate calculating the displacement amounts between multiple still images and then combining the still images to produce a high resolution image in figure 3. The combination is illustrated in figure 5A, wherein the corresponding pixels of four still images are arranged in a 2x2 matrix for every pixel location. However, Glotzbach et al explain that a common Color-Filtered Array is the Bayer pattern, which consists of 2x2 cell elements in paragraph 35. Thus, by arranging the pixels of the four still images in a 2x2 matrix when the CCD used is arranged according to the Bayer square, the images will be aligned according to the pixel hole position of a Bayer square and will fill holes in a Bayer square. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine low resolution images to fill holes in a Bayer square in the system of Honjoh, as suggested by Glotzbach et al because the Bayer pattern was common and well known in the art and widely used for inexpensive digital cameras, such as the camera of Honjoh.

15. Claims 8 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tian et al (U.S. Patent No. 6,683,966) in view of Honjoh.

Referring to claims 8 and 13,

i. Producing a physical image which includes a hidden reference signal is illustrated by Tian et al in figure 1 by the watermarked signal 112.

ii. Capturing a plurality of low resolution electronic images of said physical image is not explicitly explained by Tian et al. However, Honjoh illustrates obtaining a sequential still image in figure 3.

iii. Using the reference signal to align a plurality of the low resolution images is explained by Tian et al in column 11, lines 48-60.

iv. Combining the aligned low resolution images into a high resolution image is not explicitly explained by Tian et al. However, Honjoh illustrates that the sequential still images are combined into a high resolution image in figure 3. Honjoh explains that enhancing the resolution of digital cameras has been required with the proliferation of their use in column 2, lines 13-24. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the reference signal (watermark orientation signal) of Tian et al to align the sequential images of Honjoh and combine the images to produce a high resolution image because Honjoh explain that high resolution images are necessary with the proliferation of digital cameras.

16. Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over Honjoh in view of Tian et al.

Referring to claim 18, the reference signal being a watermark signal is not explicitly explained by Honjoh. The system of Honjoh uses the characteristic pattern of the contours as the reference signal, corresponding to claim 1i. However, Tian et al explain that a watermark

orientation signal is used to align image data in column 11, lines 48-60. Tian et al explain that watermarks are imperceptible, but may be detected by an appropriate decoder in column 1, lines 21-33. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use a watermark as a reference signal in the system of Honjoh and Glotzbach et al, as suggested by Tian et al, because the reference signal would provide a second imperceptible signal to align the images more accurately.

17. Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Bergen (U.S. Patent No. 6,208,765) in view of Tian et al.

Referring to claim 20, aligning multiple low resolution images to form a high resolution image wherein both a hidden reference signal embedded in the low resolution images and visible image content are used to align said images is not explicitly explained by Bergen. Bergen does explain aligning multiple low resolution images (figure 2) using the visible image information in column 3, lines 11-25. However, Bergen does not explain using a hidden reference signal. Tian et al explain that a watermark orientation signal is used to align image data in column 11, lines 48-60. Tian et al explain that watermarks are imperceptible, but may be detected by an appropriate decoder in column 1, lines 21-33. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use a watermark as a reference signal in the system of Bergen, as suggested by Tian et al, because the hidden reference signal would provide a second imperceptible signal to align the images more accurately.

18. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Honjoh in view of Glotzbach et al, and further in view of Tian et al.

Referring to claim 4, the reference signal being a watermark signal is not explicitly explained by Honjoh or Glotzbach et al. The system of Honjoh and Glotzbach et al uses the characteristic pattern of the contours as the reference signal, corresponding to claim 1i. However, Tian et al explain that a watermark orientation signal is used to align image data in column 11, lines 48-60. Tian et al explain that watermarks are imperceptible, but may be detected by an appropriate decoder in column 1, lines 21-33. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use a watermark as a reference signal in the system of Honjoh and Glotzbach et al, as suggested by Tian et al, because the reference signal would provide a second imperceptible signal to align the images more accurately.

***Conclusion***

19. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

- Messing et al (U.S. Patent No. 6,466,618) – To exhibit constructing a high resolution image according to a plurality of low resolution images as explained in the abstract and illustrated in figure 9.
- Stach et al (U.S. Patent Pub. No. 2002/0,136,429) – To exhibit using a watermark to align multiple images as explained in the abstract.
- Rhoads et al (U.S. Patent Pub. No. 2004/0,008,866) – To exhibit using a watermark to align multiple satellite images as explained in the abstract.

- Hunter et al (U.S. Patent Pub. No. 2003/0,025,814) – To exhibit reconstruction of a high resolution image from a plurality of Bayer pattern low resolution images as explained in the abstract.
- Yamasaki (U.S. Patent Pub. No. 2003/0,071,905) – To exhibit creating a composite image from a plurality of Bayer pattern images as explained in paragraph 99.

20. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hussein Akhavannik whose telephone number is (703)306-4049. The examiner can normally be reached on M-F 8:30-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Leo H. Boudreau can be reached on (703)305-4706. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Hussein Akhavannik H.A.
September 6, 2004

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